



Biofuels for Maine newsletter

Efficiency Maine - Biofuels

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RSE Pulp & Chemical Plans Ethanol Production from Pulp Mill Byproduct - Receives \$30 million from DOE

Old Town, ME - The University of Maine at Orono's Forest Bioproducts Research Initiative (UMO-FBRI) is working with Red Shield Environmental, LLC to revitalize an old pulp mill by utilizing a byproduct - hemicellulose - to produce ethanol. RSE Pulp & Chemical, a subsidiary of Red Shield, recently received \$30 million from the U.S. Department of Energy (DOE) to support this project [1]

In 2006, Red Shield Environmental, LLC, an investment group, bought the Old Town Mill. The company's goal was to revive the facility through renewable energy. Red Shield Environmental started out with a biomass boiler, which sells electricity to the grid. Next, the company resurrected the pulp mill, which now employs 190 people [2] This will be no ordinary pulp mill, however. It will be the first in the country to produce liquid biofuel.

Wood consists of three components: lignin, which gives trees their rigidity; cellulose, which makes up the cell wall of plants; and hemicellulose, a mix of different sugars which are more accessible for fermentation than cellulose.



Ethanol, a renewable fuel frequently blended with gasoline, is commonly made from fermenting simple sugars with yeast, in a manner similar to brewing alcohol. Yeast cannot easily access and ferment cellulose, however. In order to make "cellulosic ethanol," heat, enzymes, and/or chemicals must first break down the cellulose to make it accessible to yeast. While some small facilities make

cellulosic ethanol at a demonstration scale, it is not yet cost-effective with current technology. UMO and Red Shield are therefore focusing their attention on hemicellulose, which is a less complex mix of sugars and easier to ferment.

Using FBRI's proprietary process (developed with funding from [Maine Technology Institute](#)), Red Shield will extract the hemicellulose from the wood prior to pulping and ferment it into ethanol. Red Shield will also make food-grade acetic acid, giving it two additional revenue sources. The cellulose will continue to be made into pulp, and the lignin burned to power the process. FBRI Industrial Outreach Liaison Mike Bilodeau believes that the Mill can still maintain both the volume and quality of pulp while producing the two additional products [3].

Red Shield expects to begin production in 2011. The facility will produce roughly 2 million gallons of ethanol a year. While this is significant production for Maine, it is intended as a demonstration project. General Manager Dick Arnold believes the process can be quickly replicated at other mills. There are a number of mills in the northeast that would be appropriate, but, according to Arnold, "there's still a lot of skepticism because it hasn't been proven." Nevertheless, he is confident in the process.

The U.S. Department of Energy gave Red Shield's subsidiary RSE Pulp & Chemical \$30 million, the largest grant in Maine's history [4] to demonstrate the process. A total of \$75 million will be invested in commercializing the new technology, pouring a substantial sum into Maine's economy through construction and other jobs. That's in

addition to the 20 or so full time jobs that ethanol production will add to the Mill [5].

But Arnold and spokesman Dan Bird believe that the true value of the Red Shield ethanol project goes beyond jobs. Producing ethanol in state will reduce dependence on foreign oil, increasing energy security.

To learn more and to watch Red Shield Environmental, LLC's General Manager Dick Arnold give a tour of the facility, please visit the [Forest Bioproducts Research Initiative web page](#).

Sources:

Photo of the Old Town Facility, courtesy of Red Shield Environmental

[1] Bangor Daily News (23 April, 2008). "UM, Red Shield join forces on ethanol plant." <http://bangornews.com/news/t/business2.aspx?articleid=163382&zoneid=12>

[2] Arnold, Dick (2008). General Manager, Red Shield Environmental

[3] Bilodeau, Mike (2008). Industrial Outreach Liaison, Forest Bioproducts Research Initiative, University of Maine at Orono

[4] Bangor Daily News (23 April, 2008). "UM, Red Shield join forces on ethanol plant." <http://bangornews.com/news/t/business2.aspx?articleid=163382&zoneid=12>

[5] Bird, Dan (2008). Spokesman, Red Shield Environmental

Corundel Enterprises - On-Farm Fuel Production

Corinna, ME - Jim Medeiros of Corundel Enterprises is piloting the first (reported) on-farm biodiesel production in Maine [1]. Medeiros is a farmer who owns a milling operation, so he is well-positioned to move into biofuels.

Medeiros is currently testing his refinery equipment with waste restaurant grease and hopes to harvest his first oil seed feedstock in July. He is planting approximately 100 acres with a variety of oil seed crops including sunflower, canola and camelina, a little-known crop that grows well on poor soil [2]. He hopes this year's crop will yield approximately 10,000 gallons of biodiesel. The fuel will be used on the farm and in the mill, with some remaining to sell. If the pilot goes well, Medeiros hopes to garner investment to increase future production.



"There is a lot of ground around that's underutilized or sitting fallow," says Medeiros. "I don't think 5,000 acres [of oil seed crops] is out of the question." The problem will be proving to skeptical farmers in the area that biofuels work well.

Family farm fuel production might be new to Maine, but other states in the Northeast have proved it possible. In Vermont, three farms - State Line Farm, Clear Brook Farm, and Borderview Farm - produce biodiesel from home-grown oilseed crops. They sell the pulp from the seed to dairies or use it to feed their own cows. They use the oil to produce biodiesel to run farm equipment [3].

Corundel Enterprises' efforts are unique in several ways, however. Camelina is not currently grown much, if at all, in the Northeast. It is more popular out West. An oilseed crop that could grow well in Maine's rocky soil would be good for Maine farmers and fuel producers. Corundel Enterprises would pave the way. Furthermore, Medeiros hopes to produce biodiesel without using the traditional transesterification method. Transesterification uses methanol and lye to separate the glycerol out of vegetable oil. Without divulging details, Medeiros claims he has a method of producing biodiesel without lye or methanol, which would reduce the inputs as well as the price.

To learn more about Corundel Enterprises, contact Jim Medeiros at 207-314-3984 or send an email to jim@corundel.com

Sources:

Photo of Camelina, courtesy of Jim Medeiros

[1] Medeiros, Jim (2008). Owner, Corundel Enterprises

[2] Jacquot, J.E. (29 April, 2007). "Ancient Plant May Become New Source of Biofuel." TreeHugger:

http://www.treehugger.com/files/2007/05/ancient_plant_biodiesel.php

[3] Brown, J.E. (7 March, 2007). "Farm Fresh Fuel." The View:

<https://www.uvm.edu/theview/article.php?id=2285>

Food & Fuel - Part 1

In 2007, U.S food prices rose 4%. They are expected to rise an additional 3.5-4.5% in 2008 [1]. Biofuels are commonly blamed for rising food prices [2]. evidence suggests that biofuels, particularly

ethanol from corn, play a role [3]. Corn ethanol has increased the demand for corn. Rising demand and rising prices encourage farmers to switch from other crops to corn. This dynamic is one of many factors increasing grain prices [4]. In a recent speech, Executive Director of the UN World Food Programme Josette Sheeran listed five factors, in the following order, pushing world food prices up [5].

1. Economic boom in some parts of the developing world leading to changing diets. As the developing world consumes more meat, demand for grain for animal feed increases.
2. The price of oil. Rising energy costs increase the price of fertilizer, food production and transport.
3. Biofuels, which link the price of food to the price of fuel and increase demand for grains.
4. Increasingly severe weather. Drought in Australia and poor weather in Europe and Canada have decreased global production and increased price volatility.
5. Reactive policies restricting exports.

The weak dollar also pushes US food prices up. As US crops are cheaper to buy, this country exports more [6]. A series from The New York Times, called "The Food Chain" looks at some of these underlying causes, including biofuels, in greater depth:

http://topics.nytimes.com/top/news/business/series/the_food_chain/index.html

While biofuels are one of many factors increasing food prices, it is important not to over-generalize. Not all biofuels compete with food. In fact, many of Maine's most promising feedstocks come from "non-food" sources or complement food production:

- Waste products (used vegetable oil)
- Byproducts (hemicellulose from the paper-making industry)
- Feedstocks grown as a rotation crop to improve ecology and increase farmer income, (i.e. canola grown with potatoes)
- Crops grown on under-utilized land, which can help keep farms in business

Biofuels are not a silver bullet. Efficiency and conservation are a critical complement to renewable fuels, which cannot displace petroleum at current rates of use without unintended consequences. However, biofuels still have a role to play decreasing Maine's dependence on foreign oil, stimulating Maine's economy and reducing greenhouse gas emissions.

The next issue of Biofuels for Maine will discuss means of supporting "non-food" biofuels and other policies to reduce biofuels' contributing role in rising food prices.

Sources

[1] Capehart, T, and J. Richardson (10 April, 2008). "Food Price Inflation: Causes and Impacts." Congressional Research Services:

<http://www.nationalaglawcenter.org/assets/crs/RS22859.pdf>

[2] Brown, Lester (24 January, 2008). "Why Ethanol Production Will Drive World Food Prices Even Higher in 2008." World Resources Institute: <http://www.earth-policy.org/Updates/2008/Update69.htm>

[3] World Bank (2008). "Rising Food Prices: Policy Options and World Bank Response."

http://siteresources.worldbank.org/NEWS/Resources/Developmentcommittee_note_Apr11.doc

[4] Capehart, T, and J. Richardson (10 April, 2008). "Food Price Inflation: Causes and Impacts." Congressional Research Services:

<http://www.nationalaglawcenter.org/assets/crs/RS22859.pdf>

[5] Sheeran, Josette (18 April, 2008). "The New Face of Hunger." Center for Strategic and International Studies, Keynote Address:

http://www.csis.org/component/option,com_csis_events/task,view/id,1610/

[6] Capehart, T, and J. Richardson (10 April, 2008). "Food Price Inflation: Causes and Impacts." Congressional Research Services:

<http://www.nationalaglawcenter.org/assets/crs/RS22859.pdf>

South Portland Gulf Terminal Blends E10



South Portland, ME - In April 2008, Gulf Oil LP began blending 10% ethanol at its South Portland terminal [1]. Gulf sells the blend of 10% ethanol, 90% gasoline (E10) to a variety of gas stations, including Cumberland Farms, Exxon and Gulf Stations, located in

Southern Maine. Due to different Federally mandated air quality standards, Gulf does not sell E10 to stations north of Augusta at this time of year.

While station owners will have to make adjustments to accommodate the new fuel, Vice President of Terminal Operations Bob Rosadini assures customers that "they shouldn't have any concerns at all. They should look at it as a way to supplement gasoline supplies." The transition for the average driver will be seamless [2].

Some Maine customers are concerned about the effect ethanol will have on older engines, particularly boats and small power equipment such as lawnmowers [3]. Because ethanol is a good cleaning agent, it can clog filters and fuel lines, particularly in older fuel systems. But most of the Northeast, including New Jersey, Southern New York, Rhode Island, Massachusetts, and Connecticut, switched to E10 two years ago without major problems. Rosadini believes the same will be true for Maine.

According to Laura Scott, Vice President of Trading at Gulf, the company made the switch in order to provide an "environmentally sound and cost-effective fuel for customers in Maine." The ethanol blend is significantly discounted compared to other types of gas.

Scott recognizes that corn ethanol is not a perfect solution. "We view it as an interim solution." She notes that, with its big pulp and paper industry, Maine is in a good place to transition to cellulosic ethanol, which can be made from wood waste and other organic products. Though it has pluses and minuses, Scott believes that "corn ethanol is helping the industry to grow. When technology is available to make cellulosic ethanol in an economically viable way, it will be easier for cellulosic ethanol to blend into the stream of fuels. The use of corn based ethanol will have introduced motorists to ethanol as a viable alternative."

Sources:

Photo of Maine E10 Pump, courtesy of Marshall Moore

[1] Scott, Laura (2008). Vice President of Trading, Gulf Oil.

[2] Rosadini, Robert (2008). Vice President of Terminal Operations, Gulf Oil.

[3] Turkel, Tux (8 May, 2008). "Ethanol has arrived. Maine gas stations and marinas scramble to prepare customers for the blended gas." Portland Press Herald:
<http://pressherald.mainertoday.com/story.php?id=186426&ac=PHnws>

Bio-Buzz Short Takes

Media:

- Can't get enough Bio-Buzz? Three organizations offer regular news with differing perspectives:
 - Biofuels Digest: The Daily Source for Biofuels News
 - Friends of the Earth Europe's Agrofuels Campaign



- National Resources Defense Council: Nathanael Greene's Blog
- **Biodiesel or Bioheat Questions? Ask Ben:**
The National Biodiesel Board offers the Biodiesel Education Network - BEN. Ask BEN any question about biodiesel or bioheat and receive a response within 48 hours.
- **Fields of Fuel:**
Fields of Fuel, a documentary on biodiesel as a solution to oil dependence, won the "audience award" for documentaries at the 2008 Sundance Film Festival [1]. Director Josh Tickell is author of "From the Fryer to the Fuel Tank" and "Biodiesel America." for more information, see <http://www.fieldsoffuel.com/>

Politics and Policy:

- **ASTM to vote on Bioheat, June 17:**
The American Society for Testing and Materials (ASTM) will meet in Vancouver on June 17 to vote on whether to amend ASTM D 396 heating oil specifications to include 5% biodiesel. Many Maine BioHeat customers currently have to sign a waiver to run burners on BioHeat because Underwriters Laboratories (UL) only approves burners to run on ASTM D 396 fuels. A vote to amend the heating oil standards will be a major step forward in a lengthy process to remove the barriers to BioHeat [2] [3]. Stay tuned for more in the next issue of Biofuels for Maine.
- **Maine Senator Makes EPA Request on Renewable Fuels Standard:**
On May 7, the Senate Homeland Security and Governmental Affairs Committee held a hearing to examine the effect of ethanol production on food prices. Andrew Seigel, owner of When Pigs Fly Bakery based in Kittery, testified that the price of flour nearly tripled between September and February, pinching his family business [4]. Joining 23 other Republican senators, Sen. Susan Collins sent a letter to the EPA asking it to re-examine last year's federal mandate requiring refiners to nearly double the amount of corn ethanol used in gasoline [5].
- **UN Examines Second Generation Biofuels and Invasive Species:**
Second generation biofuels, such as cellulosic ethanol, are promising because they can be made from non-food crops, such

as poplar, willow and switchgrass. At a recent meeting of the United Nations in Germany, however, the Global Invasive Species Program, the Nature Conservancy and the International Union for the Conservation of Nature presented a paper warning that many of the promising feedstocks for second generation biofuels pose dangers as invasive species - weeds that will out-compete native species, spreading to farms and disrupting natural ecosystems. The organizations reached their conclusions by comparing a list of popular second generation feedstocks with a list of invasive species and finding significant overlap [6]

Sources:

Photo of Josh Tickell in "Fields of Fuel," from <http://www.fieldsoffuel.com/>

[1] Voynar, Kim (27 January, 2008). "Sundance Review:Fields of Fuel." Cinematical: <http://www.cinematical.com/2008/01/27/sundance-review-fields-of-fuel/>

[2] Cerio, Robert (2008). Consultant, National Biodiesel Board.

[3] Nazzaro, Paul (2008). Petroleum Liaison, National Biodiesel Board. [4] Collins, Senator Susan (10 May, 2008). "Hearing on corn-based ethanol problems."

<http://www.susancollins.com/susans-blog/hearing-corn-based-ethanol-problems>

[5] Haberman, Shir (9 May, 2008). "Local Businessman Testifies Against US Ethanol Policy." Seacoastonline.com:

<http://www.seacoastonline.com/apps/pbcs.dll/article?AID=/20080509/NEWS/805090443>

[6] Rosenthal, Elisabeth (21 May, 2008). "New Trend in Biofuels Has New Risks." New York Times:

http://www.nytimes.com/2008/05/21/science/earth/21biofuels.html?_r=2&scp=1&q=elisabeth+rosenthal&st=nyt&oref=slogin&oref=slogin

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